



BUSINESS CASE:

On-site Stormwater Management

What is the cost effective way to manage stormwater in urban centers while meeting the City of Redmond's social, environmental, and economic goals? This business case analyzes four scenarios to help the City plan for future environmental compliance strategies.

PREPARED BY:



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Scenario Summary Page

The below tables summarize the Business Case Analysis (BCA) results for four stormwater management scenarios, utilizing the business case framework developed by FCS GROUP in collaboration with City staff. The subsequent pages provide additional details regarding the scenarios and BCA results.

This review covers both the Downtown and Overlake urban centers. Some of the criteria measured in this analysis show no significant impact on factors important to the City of Redmond. This means that while one scenario may be “better” than another in these criteria, the meaningful impact is small and thus not applicable for ranking.

Overall Analysis Ranking

	No Infiltration	100% Infiltration at ½ the Sites	91% Infiltration	100% Infiltration	
	Fourth	Second	Third	First	

Total Lifecycle Costs

	No Infiltration	100% Infiltration at ½ the Sites	91% Infiltration	100% Infiltration	
	\$153 Million	\$128 Million	\$137 Million	\$98 Million	

Individual Criteria Ranking

Criteria	No Infiltration	100% Infiltration at ½ the Sites	91% Infiltration	100% Infiltration	Relative Impact
Regional flow control and flood protection	Fourth	Second	Third	First	High
Regional Stormwater Runoff Treatment Costs	Fourth	Third	Second	First	High
Private infiltration system costs (capital & O&M)	First	Second	Third	Fourth	Low
Change in market value	First	Third	Second	Fourth	Low
Stream Water Quality	Fourth	Third	Second	First	Very Low
Well shut-off potential increase ^(A)	Second	N/A	N/A	First	Very Low
Sammamish Stream Temp ^(A)	Second	N/A	N/A	First	Very Low

(A) The two scenarios labeled “N/A” were not studied further because the result for first and second ranked scenarios were similar.

The City evaluated additional criteria. One example is the ancillary benefits of green infrastructure with many well documented ancillary benefits: www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf. This analysis focused on roof infiltration which do not have ancillary benefits like rain gardens and green roofs. In Overlake, green infrastructure will collocate in required landscaped areas.

100% Infiltration Scenario

Under this scenario, all development with good soils in the Downtown and Overlake regions infiltrate 100% of stormwater runoff generated by roofs. This results in the least amount of stormwater entering the conveyance system.

Total Anticipated Lifecycle Cost:

\$98 M

Life Cycle Cost Ranking:

First

DETAILED OVERVIEW OF BENEFITS AND COSTS

GOAL 1

Protect human health and safety by managing system capacity and well water supply

	Effect	Measurable Impact	Ranking
Well shut-off potential increase	Up to 4 inches increase in groundwater levels	No measurable impact	First
Regional flow control and flood protection	Greatest infiltration levels lowers regional flow control requirements and conveyance upsizing needs, minimizing capital costs	\$49 million	First

GOAL 2

Help meet development goals for Overlake and Downtown through cost effective, predictable, permit compliant regulations

	Effect	Measurable Impact	Ranking
Private infiltration system costs (capital & O&M)	Larger facilities on 100% of sites mean the highest maintenance and capital costs	\$19 million	Fourth
Change in market value	Only 3% of sites feasibly impacted through potentially smaller building footprints	\$8 million	Fourth

GOAL 3

Maintain or increase environmental protection through stormwater management

	Effect	Measurable Impact	Ranking
Sammamish Stream Temp	Slightly lower temperatures reaching Sammamish due to increased groundwater flows	No measurable impact	N/A
Stream Water Quality (Metals)	2.77 kg annual copper loading from Redmond Way basin	No measurable impact	First
Regional Stormwater Runoff Treatment Costs (Capital & O&M)	High levels of infiltration leads to lower treatment costs	\$21 million	First

100% Infiltration at ½ the Sites Scenario

Under this scenario, it is assumed that 50% of developments with good soils infiltrate 100% of stormwater runoff generated by roofs. This means that 50% of all sites with good soils would consider stormwater infiltration infeasible. This scenario is most similar to the state of stormwater infiltration in new developments as occurred prior to the new Ecology standards.

Total Anticipated Lifecycle Cost:

\$128 M

Life Cycle Cost Ranking:

Second

DETAILED OVERVIEW OF BENEFITS AND COSTS

GOAL 1

Protect human health and safety by managing system capacity and well water supply

	Effect	Measurable Impact	Ranking
Well shut-off potential increase	Groundwater levels assumed not to change from current	No measurable impact	N/A
Regional flow control and flood protection	100% infiltration at ½ the sites reduces large storm impact and reduces capital costs for conveyance and flow control	\$82 million	Second

GOAL 2

Help meet development goals for Overlake and Downtown through cost effective, predictable, permit compliant regulations

	Effect	Measurable Impact	Ranking
Private infiltration system costs (capital & O&M)	Larger facilities cost more but are only on 50% of sites. Maintenance costs do not vary significantly by size	\$10 million	Third
Change in market value	Only 1.5% of sites potentially impacted through reduced building site size	\$4 million	Second

GOAL 3

Maintain or increase environmental protection through stormwater management

	Effect	Measurable Impact	Ranking
Sammamish Stream Temp	Minimal measurable effect	No measurable impact	N/A
Stream Water Quality (Metals)	3.13 kg annual copper loading from Redmond Way basin	No measurable impact	Third
Regional Stormwater Runoff Treatment Costs (Capital & O&M)	50% of stormwater infiltration still requires regional treatment investment	\$32 million	Third

91% Infiltration Scenario

This scenario considers a cost-effective on-site infiltration option where 100% of sites with good soils infiltrate only 91% of stormwater runoff generated by roofs. 91% infiltration results in lower on-site costs due to the smaller size of the facilities.

Total Anticipated Lifecycle Cost:

\$137 M

Life Cycle Cost Ranking:

Third

DETAILED OVERVIEW OF BENEFITS AND COSTS

GOAL 1

Protect human health and safety by managing system capacity and well water supply

	Effect	Measurable Impact	Ranking
Well shut-off potential increase	Between zero and 4 inches increase in groundwater levels assumed	No measurable impact	N/A
Regional flow control and flood protection	91% infiltration does not assist in conveying large storms meaning higher capital requirements for conveyance upsizing	\$102 million	Third

GOAL 2

Help meet development goals for Overlake and Downtown through cost effective, predictable, permit compliant regulations

	Effect	Measurable Impact	Ranking
Private infiltration system costs (capital & O&M)	Smaller facilities lower costs but additional sites increase maintenance costs	\$8 million	Second
Change in market value	Only 3% of sites potentially impacted but with smaller facility sizes	\$2 million	Second

GOAL 3

Maintain or increase environmental protection through stormwater management

	Effect	Measurable Impact	Ranking
Sammamish Stream Temp	Minimal measurable effect	No measurable impact	N/A
Stream Water Quality (Metals)	2.84 kg annual copper loading from Redmond Way basin	No measurable impact	Second
Regional Stormwater Runoff Treatment Costs (Capital & O&M)	Slightly lower capital and operations requirements due to infiltration from sites	\$25 million	Second

No Infiltration Scenario

Under this scenario all development in the Downtown and Overlake regions do not infiltrate any stormwater from building roofs. This means that all stormwater generated by roofs flows into the stormwater conveyance system.

Total Anticipated Lifecycle Cost:

\$153 M

Life Cycle Cost Ranking:

Fourth

DETAILED OVERVIEW OF BENEFITS AND COSTS

GOAL 1

Protect human health and safety by managing system capacity and well water supply

	Effect	Measurable Impact	Ranking
Well shut-off potential increase	Up to 1.8 inches reduced groundwater levels	No current measurable impact	Second
Regional flow control and flood protection	No infiltration will require the highest capital investment in conveyance, flow control, and runoff treatment	\$114 million	Fourth

GOAL 2

Help meet development goals for Overlake and Downtown through cost effective, predictable, permit compliant regulations

	Effect	Measurable Impact	Ranking
Private infiltration system costs (capital & O&M)	With no onsite infiltration, there are no additional costs	\$0	First
Change in market value	No onsite infiltration means no potential reduction in building or parking size	\$0	First

GOAL 3

Maintain or increase environmental protection through stormwater management

	Effect	Measurable Impact	Ranking
Sammamish Stream Temp	Less groundwater flow, higher water temps reaching the river from Downtown	No measurable impact	Second
Stream Water Quality (Metals)	3.49 kg annual copper loading from Redmond Way basin	No measurable impact	Fourth
Regional Stormwater Runoff Treatment Costs (Capital & O&M)	More stormwater treatment leads to higher capital and operations costs	\$39 million in costs	Fourth